

I CLAIM:

A method for transforming a set of closed first curves defined on a surface, wherein the first curves contain no self-crossover points, the method comprising the steps of;

(i) providing a pattern comprising a set of continuous second curves for projection over the set of first curves upon the surface, wherein the second curves contain no self-crossover points;

(ii) determining a set of intersection points of the set of first curves with the set of second curves;

(iii) determining a set of crossover points within the set of intersection points; and

(iv) selecting curve intervals, delimited by the crossover points, from the set of first curves and the set of second curves in accordance with a predetermined rule to form closed loops; wherein the closed loops form said transformed set of closed curves.

2. A method as claimed in claim 1, wherein said step (iv) comprises the substeps of:

(iv)(1) ordering all the crossover points in accordance with a predetermined order;

(iv)(2) marking one of said crossover points that is highest in the order and that has not been previously marked;

(iv)(3) determining, if a last marked crossover point is a first point in a said closed loop, and if so:

(iv)(3)(i) selecting one of said curve intervals starting at said first point and terminating at an unmarked crossover point; and

(iv)(3)(ii) marking the terminating crossover point of said one curve interval;

or if not:

(iv)(3)(iii) selecting a further said curve interval starting at the previous said terminating crossover point and terminating at an unmarked crossover point; and

(iv)(3)(iv) marking the current terminating crossover point of said further curve interval;

(iv)(4) repetitively performing the substep (iv)(3) until said closed loop is formed; and

(iv)(5) repetitively performing the substeps (iv)(2) to (iv)(4) until all possible closed loops have been formed.

3. A method as claimed in claim 2, wherein said substep (iv)(3)(i) comprises
5 selecting a further said curve interval from the set of first curves, which said one curve interval starts at a said first point and continues in a first direction and terminates at the next adjacent unmarked crossover point.
4. A method as claimed in claim 2, wherein said substep (iv)(3)(ii) comprises
10 selecting a said curve interval from the set of first or second curves, which selected curve interval is the first of said curve intervals located in a second direction from the previously selected curve interval and which selected curve interval continues in a third direction and terminates at the next adjacent unmarked crossover point.
- 15 5. A method as claimed in claim 2, wherein said substep of ordering said crossover points comprises ordering the crossover points according to their position along the set of first curves in a fourth direction.
6. A method as claimed in claim 5, wherein said first direction and fourth direction
20 are in the forward direction and said third direction is either in the positive or negative direction and said second direction is the backward direction.
7. A method as claimed in claim 5, wherein said first direction and fourth direction
25 are in the backward direction and said third direction is either in the positive or negative direction and said second direction is the forward direction.
8. A method as claimed in claim 1, wherein said surface is a 2-dimensional surface.
9. A method as claimed in claim 1, wherein said surface is a 3-dimensional surface.
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10. A method as claimed in claim 1, wherein said step of selecting curve intervals comprises the substep of filling the closed loops with a predetermined color.
11. A method as claimed in claim 1, wherein said step of providing a pattern,
35 comprises the substep of:

generating said pattern.

12. A method as claimed in claim 1, wherein said step of providing a pattern, comprises the substep of:

5 accessing said pattern from storage.

13. A method as claimed in claim 1, wherein said step of providing a pattern, comprises the substep of:

selecting one of many said patterns in response to user input.

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14. A method as claimed in claim 11, wherein said generating step comprises inputting parameters.

15. A method as claimed in claim 14, wherein said input parameters comprise one or more of the following; base shapes of the patterns, period of the patterns, or amplitude of the patterns.

16. A method as claimed in claim 15, wherein the amplitude of the pattern varies throughout the pattern.

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17. A method as claimed in claim 1, wherein the set of first curves constitutes a character glyph of a font.

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18. Apparatus for transforming a set of closed first curves defined on a surface, wherein the first curves contain no self-crossover points, the apparatus comprising; providing means for providing a pattern comprising a set of continuous second curves for projection over the set of first curves upon the surface, wherein the second curves contain no self-crossover points;

30 first curves with the set of second curves;

a second determining means for determining a set of crossover points within the set of intersection points; and

a first selecting means for selecting curve intervals, delimited by the crossover points, from the set of first curves and the set of second curves in accordance with a

predetermined rule to form closed loops; wherein the closed loops form said transformed set of closed curves.

19. Apparatus as claimed in claim 18, wherein said first selecting means comprises:
5 ordering means for ordering all the crossover points in accordance with a predetermined order;
a first marking means for marking one of said crossover points that is highest in the order and that has not been previously marked;
10 a second selecting means for selecting one of said curve intervals starting at a first point and terminating at an unmarked crossover point;
a second marking means for marking the terminating crossover point of said one curve interval;
a third selecting means for selecting a said curve interval starting at the previous said terminating crossover point and terminating at an unmarked crossover point;
15 a third marking means for marking the current terminating crossover point of said one curve interval;
a third determining means for determining, if a last marked crossover point is the first point in a said closed loop, and if so performing the operations of the second selecting means and the second marking means, or if not, performing the operations of the
20 third selecting means and third marking means;
means for repetitively performing the operations of the third determining means until said closed loop is formed; and
means for repetitively performing the operations of first marking means and third determining means until all possible closed loops have been formed.
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20. Apparatus as claimed in claim 19, wherein said second selecting means selects one of said curve intervals from the set of first curves, which said one curve interval starts at a said first point and continues in a first direction and terminates at the next adjacent unmarked crossover point.
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21. Apparatus as claimed in claim 19, wherein said third selecting means selects a further said curve interval from the set of first or second curves, which selected curve interval is the first of said curve intervals located in a second direction from the previously selected curve interval and which selected curve interval continues in a third direction and terminates at the next adjacent unmarked crossover point.
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22. Apparatus as claimed in claim 19, wherein said ordering means orders the crossover points according to their position along the set of first curves in a fourth direction.

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23. Apparatus as claimed in claim 22, wherein said first direction and fourth direction are in the forward direction and said third direction is either in the positive or negative direction and said second direction is the backward direction.

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24. Apparatus as claimed in claim 22, wherein said first direction and fourth direction are in the backward direction and said third direction is either in the positive or negative direction and said second direction is the forward direction.

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25. Apparatus as claimed in claim 18, wherein said surface is a 2-dimensional surface.

26. Apparatus as claimed in claim 18, wherein said surface is a 3-dimensional surface.

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27. Apparatus as claimed in claim 18, wherein said first selecting means comprises means for filling the closed loops with a predetermined color.

28. Apparatus as claimed in claim 18, wherein said providing means comprises means for generating said pattern.

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29. Apparatus as claimed in claim 18, wherein said providing means comprises means for accessing said pattern from storage.

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30. Apparatus as claimed in claim 18, wherein said providing means comprises means for selecting one of many said patterns in response to user input.

31. Apparatus as claimed in claim 28, wherein said generating means comprises means for inputting parameters.

32. Apparatus as claimed in claim 31, wherein said input parameters comprise one or more of the following; base shapes of the patterns, period of the patterns, or amplitude of the patterns.
- 5 33. Apparatus as claimed in claim 32, wherein the amplitude of the pattern varies throughout the pattern.
34. Apparatus as claimed in claim 18, wherein the set of first curves constitutes a character glyph of a font.
- 10 35. A computer program product comprising a computer readable medium including a computer program for transforming a set of closed first curves defined on a surface, wherein the first curves contain no self-crossover points, the computer program product comprising;
- 15 providing means for providing a pattern comprising a set of continuous second curves for projection over the set of first curves upon the surface, wherein the second curves contain no self-crossover points;
- 20 a first determining means for determining a set of intersection points of the set of first curves with the set of second curves;
- 25 a second determining means for determining a set of crossover points within the set of intersection points; and
- a first selecting means for selecting curve intervals, delimited by the crossover points, from the set of first curves and the set of second curves in accordance with a predetermined rule to form closed loops; wherein the closed loops form said transformed set of closed curves.
36. A computer program product as claimed in claim 35, wherein said first selecting means comprises:
- 30 ordering means for ordering all the crossover points in accordance with a predetermined order;
- a first marking means for marking a said crossover point that is highest in the order and that has not been previously marked;
- 35 a second selecting means for selecting a said curve interval starting at a first point and terminating at an unmarked crossover point;
- a second marking means for marking the terminating crossover point;

a third selecting means for selecting a said curve interval starting at the previous said terminating crossover point and terminating at an unmarked crossover point;

a third marking means for marking the current terminating crossover point;

5 a third determining means for determining, if the last marked crossover point is the first point in a said closed loop, and if so performing the operations of the second selecting means and the second marking means, or if not, performing the operations of the third selecting means and third marking means;

means for repetitively performing the operations of the third determining means until said closed loop is formed; and

10 means for repetitively performing the operations of first marking means and third determining means until all possible closed loops have been formed.

37. A computer program product as claimed in claim 36, wherein said second selecting means selects a said curve interval from the set of first curves, which said curve interval starts at a said first point and continues in a first direction and terminates at the next adjacent unmarked crossover point.

38. A computer program product as claimed in claim 36, wherein said third selecting means selects a said curve interval from the set of first or second curves, which selected curve interval is the first of said curve intervals located in a second direction from the previously selected curve interval and which selected curve interval continues in a third direction and terminates at the next adjacent unmarked crossover point.

39. A computer program product as claimed in claim 36, wherein said ordering means orders the crossover points according to their position along the set of first curves in a fourth direction.

40. A computer program product as claimed in claim 39, wherein said first direction and fourth direction are in the forward direction and said third direction is either in the positive or negative direction and said second direction is the backward direction.

41. A computer program product as claimed in claim 39, wherein said first direction and fourth direction are in the backward direction and said third direction is either in the positive or negative direction and said second direction is the forward direction.

42. A computer program product as claimed in claim 35, wherein said surface is a 2-dimensional surface.

43. A computer program product as claimed in claim 35, wherein said surface is a 3-dimensional surface.

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44. A computer program product as claimed in claim 35, wherein said first selecting means comprises means for filling the closed loops with a predetermined color.

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45. A computer program product as claimed in claim 35, wherein said providing means comprises means for generating said pattern.

46. A computer program product as claimed in claim 35, wherein said providing means comprises means for retrieving said pattern from storage.

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47. A computer program product as claimed in claim 35, wherein said providing means comprises means for selecting one of many said patterns in response to user input.

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48. A computer program product as claimed in claim 45, wherein said generating means comprises means for inputting parameters.

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49. A computer program product as claimed in claim 48, wherein said input parameters comprise one or more of the following; base shapes of the patterns, period of the patterns, or amplitude of the patterns.

50. A computer program product as claimed in claim 49, wherein the amplitude of the pattern varies throughout the pattern.

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51. A computer program product as claimed in claim 35, wherein the set of first curves constitutes a character glyph of a font.

52. A method of modifying a typeface, font, or character, wherein said typeface, font, or character comprises a set of closed first curves, wherein the set of first curves contain no self-crossover points, the method comprises the steps of:

projecting a pattern comprising a set of continuous second curves over the set of first curves, wherein the set of first curves contain no self-crossover points;

determining a set of intersection points of the set of first curves with the set of second curves;

5 determining a set of crossover points within the set of intersection points; and

selecting curve intervals, delimited by crossover points, from the set of first curves and the set of second curves to form a set of closed third curves, wherein said set of closed third curves form a modified said typeface, font, or character.

10 ~~53.~~ Apparatus for modifying a typeface, font, or character, wherein said typeface, font, or character comprises a set of closed first curves, wherein the set of first curves contain no self-crossover points, the apparatus comprising:

means for projecting a pattern comprising a set of continuous second curves over the set of first curves, wherein the set of first curves contain no self-crossover points;

15 means for determining a set of intersection points of the set of first curves with the set of second curves;

means for determining a set of crossover points within the set of intersection points; and

20 means for selecting curve intervals, delimited by crossover points, from the set of first curves and the set of second curves to form a set of closed third curves, wherein said set of closed third curves form a modified said typeface, font, or character.

25 ~~54.~~ A computer program product comprising a computer readable medium including a computer program for modifying a typeface, font, or character, wherein said typeface, font, or character comprise a set of closed first curves, wherein the set of first curves contain no self-crossover points, the computer program product comprising:

means for projecting a pattern comprising a set of continuous second curves over the set of first curves, wherein the set of first curves contain no self-crossover points;

30 means for determining a set of intersection points of the set of first curves with the set of second curves;

means for determining a set of crossover points within the set of intersection points; and

35 means for selecting curve intervals, delimited by crossover points, from the set of first curves and the set of second curves to form a set of closed third curves, wherein said set of closed third curves form a modified said typeface, font, or character.

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- ~~55.~~ A method of modifying a typeface, font, or character, wherein said typeface, font, or character comprises a set of closed first curves, wherein the set of first curves contain no self-crossover points, the method comprises the steps of:
- 5 projecting a pattern comprising a set of continuous second curves over the set of first curves, wherein the set of first curves contain no self-crossover points;
- determining a set of intersection points of the set of first curves with the set of second curves;
- determining a set of crossover points within the set of intersection points;
- 10 selecting unmarked adjacent crossover points to form a closed loop;
- marking the selected adjacent crossover points; and
- repetitively performing the selecting and marking steps until a set of said closed loops have been formed, wherein said closed loops form a modified typeface, font, or character.
- ~~56.~~ Apparatus for modifying a typeface, font, or character, wherein said typeface, font, or character comprises a set of closed first curves, wherein the set of first curves contain no self-crossover points, the apparatus comprising:
- means for projecting a pattern comprising a set of continuous second curves over the set of first curves, wherein the set of first curves contain no self-crossover points;
- 20 means for determining a set of intersection points of the set of first curves with the set of second curves;
- means for determining a set of crossover points within the set of intersection points;
- means for selecting unmarked adjacent crossover points to form a closed loop;
- means for marking the selected adjacent crossover points; and
- 25 means for repetitively performing the operations of the selection and marking means until a set of said closed loops have been formed, wherein said closed loops form a modified typeface, font, or character.
- ~~57.~~ A computer program product comprising a computer readable medium including a computer program for modifying a typeface, font, or character, wherein said typeface, font, or character comprises a set of closed first curves, wherein the set of first curves contain no self-crossover points, the computer program comprising:
- means for projecting a pattern comprising a set of continuous second curves over the set of first curves, wherein the set of first curves contain no self-crossover points;

means for determining a set of intersection points of the set of first curves with the set of second curves;

means for determining a set of crossover points within the set of intersection points;

means for selecting unmarked adjacent crossover points to form a closed loop;

means for marking the selected adjacent crossover points; and

means for repetitively performing the operations of the selection and marking means until a set of said closed loops have been formed, wherein said closed loops form a modified typeface, font, or character.

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